CLAIMS

We claim:

1. A process for sealing the surface of a porous ceramic body with a thin, gas impermeable, glass glaze, comprising:
   a) mixing glass particles with a solvent to make a smooth slurry; wherein the glass particles are suspended in the slurry;
   b) depositing a thin layer of the slurry on the surface of the porous ceramic body;
   c) removing the solvent by drying with heat; and
   d) firing the coated body at a temperature sufficient to melt and fuse the glass particles together to make a continuous, pinhole free, gas impermeable glaze that seals the surface of the porous ceramic body, wherein the glaze does not contain Na_2O, K_2O, PbO or CaO low melting point oxides.

2. The process of claim 1, wherein the fused glass has a coefficient of thermal expansion that matches the thermal expansion coefficient of the porous ceramic body.

3. The process of claim 2, wherein the glass comprises an alkali barium borosilicate glass.

4. The process of claim 3, wherein the glass comprises 7052 glass made by Corning Inc.

5. The process of claim 1, wherein the glass particles are smaller than 100 microns.

6. The process of claim 5, wherein the glass particles are smaller than 50 microns.

7. The process of claim 1, wherein the solvent comprises any solvent that does not leave a residual contaminant after drying.

8. The process of claim 7, wherein the solvent comprises a fluid is selected from the group consisting of alcohol, ethanol, propanol, amyl acetate, and a perfluorocarbon fluid.

9. The process of 1, wherein the solvent comprises a perfluorocarbon-based Fluorinert™ fluid.

10. The process of claim 1, comprising ultrasonically mixing the glass particles with the solvent to make the smooth slurry.

11. The process of claim 1, further comprising mixing 25 grams of Corning 7052 glass powder in 50 mls of amyl acetate to make the slurry.

12. The process of claim 1, further comprising mixing 20 grams of Corning 7052 glass powder in 60 mls of Fluorinert™ fluid to make the slurry.

13. The process of claim 1, the slurry is deposited using a method selected from the group consisting of dipping, brushing, spraying, spin coating, vacuum pulling, and slip casting.

14. The process of claim 1, wherein removing the solvent by drying with heat comprises drying the coated body under a heat lamp for about 1 hour.

15. The process of claim 1, wherein firing the coated body comprises heating to body to 1000 C in a furnace with atmospheric nitrogen and holding for 15 minutes.

16. The process of claim 15, further comprising ramping up the body's temperature at a rate of 5 degrees C per minute.

17. The process of claim 15, further comprising cooling down the body's temperature at a rate of 15 degrees C per minute.

18. The process of claim 1, wherein the porous ceramic comprises porous alumina.

19. The process of claim 18, wherein the porous alumina body comprises a porous alumina tube.

20. The process of claim 18, wherein the porous alumina tube comprises an inorganic microporous thin film separation membrane disposed on the inner surface of the tube.

21. The process of claim 20, wherein the inorganic thin film separation membrane comprises a zeolite material.

22. The process of claim 20, further comprising depositing the inorganic microporous thin film separation membrane on the tube's inner surface after the glass particles have been fired in step d) of claim 1.

23. The process of claim 18, wherein the firing temperature is sufficiently high that at least some of the alumina is sorbed into the glass during firing.

24. A porous ceramic body comprising a thin, gas impermeable, glass glaze disposed on the body's surface by the process of claim 1.

25. The glaze of claim 24, wherein the thickness of the glass is in-between 0.001 and 0.005 inches.

26. The glaze of claim 25, wherein the thickness of the glass is approximately 0.0025 inches.

27. A microporous, inorganic thin film membrane disposed on the inner surface of a porous alumina tube, wherein the tube comprises at least one gas impermeable end seal fabricated on the tube by the process of claim 1.

28. A microporous, inorganic thin film membrane disposed on the inner surface of a porous alumina tube, wherein the tube comprises at least one gas impermeable end seal, wherein the end seal comprises a borosilicate glass formulated to have a coefficient of thermal expansion that matches the coefficient of thermal expansion of alumina.

29. The article of claim 28, wherein the borosilicate glass comprises 7052 glass manufactured by Corning Inc.

30. The process of claim 1, wherein the porous ceramic body comprises a porous ceramic disk, and further wherein the glass glaze is deposited on the outer periphery of the disk.